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BY ELECTRONIC MAIL
Patrick Morris
Senior Water Quality Control Engineer
California Regional Water Quality Control Board
Central Valley Region
11020 Sun Center Drive #200
Rancho Cordova, CA 95670-6114

Dear Mr. Morris:

I am writing in response to your request of June 21, 2006 to provide a peer review of the Amendment to the Basin Plan and TMDL for mercury in the Sacramento-San Joaquin Delta (the Delta). I have reviewed the documents provided as well as other materials related to the project and have evaluated the scientific basis for the proposed actions. My comments are listed below:

1. General Impressions

The proposed basin plan amendments and supporting TMDL describe an approach for addressing the elevated concentrations of mercury in the Delta. The approach also addresses the mass of mercury released from the Delta because control of the export of mercury from the Central Valley is integral to the proposed San Francisco Bay TMDL. The general approach of the TMDL is to control methylmercury by reducing methylmercury concentrations in wastewater effluent and the mass of inorganic mercury released to the Delta from upstream sources. Given the complexity of the problem and the difficulties associated with setting goals that are achievable, I believe that the staff members have used the available scientific data in a reasonable manner. Although I have some concerns about specific details, I have not found any major flaws that would call the scientific approach into question.

2. Total Mercury Control Actions (Page ES-4; BPA 3-4)

The Executive Summary includes a statement that NPDES-permitted WWTPs must implement a pollution control plan for total mercury. No scientific evidence is presented in the report that supports the idea that these programs will have a measurable impact on methylmercury released from WWTPs. According to the TMDL, methylmercury is the main concern at WWTPs and inorganic mercury is much less of an issue because concerns associated with releases to San Francisco Bay are related to particle-associated mercury and not dissolved inorganic mercury (i.e., WWTPs don't discharge high TSS loads). The science presented in the report supports the idea of finding ways to minimize methylmercury formation in WWTPs but the data in the appendix (e.g., Figure G.2) do

not support the idea that there is a relationship between either influent inorganic mercury or methylmercury and effluent methylmercury concentrations. Although no data are presented on total mercury in wastewater influent and effluent, I suspect that source reduction will have little or no effect on effluent total mercury concentrations. The main benefit of source control would probably be a decrease in mercury concentrations in sludge produced by the wastewater treatment plants. While there are benefits associated with lowering mercury concentrations in sludge, it would be hard to justify such benefits as part of the Delta TMDL process.

3. Possible error in Table B (page BPA-12)

Is the percent reduction for the W. Sacramento WWTP supposed to be 0% and not 100%?

4. Beneficial uses: impairment of municipal and domestic supply (p. 15 of staff report and p. 133 of TMDL)

I recognize that the CTR specifies a standard of 50 ng/L for a 30-day running average mercury concentration in water and I agree with the staff analysis of the 30-day running averages. Therefore, from a legal standpoint the CTR is violated. However, I believe that the staff report should discuss the fact that the elevated inorganic mercury concentrations are attributable to the high TSS during high flow events and that the suspended solids would be removed during conventional water treatment. My impression is that the CTR mercury value was developed to protect humans from exposure to mercury through consumption of fish and to prevent high concentrations of dissolved mercury from being delivered in tap water. Although the CTR may be violated from a legal standpoint, there is no scientific evidence that potable water supply is threatened by mercury. (Ultimately, this is not an important issue because the proposed activities probably would bring the Delta into compliance with respect to the 50 ng/L value. However, I think the document implies that municipal water supplies in the Delta are unsafe because of mercury and such a conclusion is not supported by the available science.)

5. Correlations between LMB MeHg concentration and TL4 Fish MeHg concentrations (Staff report p. 27 and TMDL page 54)

To convert MeHg concentrations in a TL4 150-500 mm fish to a LMB MeHg concentration a linear regression model is used. As stated in the footnote on page 53, the regression equation was forced through the origin. The other curves used a logarithmic relationship with no constraints on the data. Given the fact that these are empirical fits there is no basis for forcing this one regression through the origin and not imposing similar constraints on the other relationships. (I realize that you cannot fit log-transformed data through the origin.) If there is no basis for forcing the fit through the origin, a simple linear regression should be used, which might yield a slightly lower value for the LMB MeHg concentration.

6. Apparent disconnect for snowy plover (TMDL page p. 33, Table 4.2 and p. 47, section 4.7.2)

In table 4.2 it appears that the safe dietary concentration of methylmercury is 0.026 mg/kg. However, in section 4.7.2 the snowy plover value is 1.12 mg/kg. I believe that this is related to the fact that most of the snowy plover's diet consists of aquatic and terrestrial invertebrates. However, it is unclear if any assumptions have been made about MeHg concentrations from this portion of the snowy plover's diet.

7. Example calculation (TMDL p. 36)

For clarity, I suggest you show more than one significant figure on the example calculations.

8. Missing reference (TMDL p. 50)

Davis and Greenfield (2002) is not included in the reference list.

9. Municipal and industrial sources of MeHg (TMDL p. 76)

The analysis of municipal and industrial sources of MeHg ultimately results in the decision that WWTPs in sub-regions where the MeHg concentrations are too high will have to reduce their concentrations to values as low as 0.06 ng/L. However, other industrial users are not subject to the same restrictions because a comparison of intake and outflow data suggests that they are not increasing MeHg concentrations through their processes. What about a wastewater treatment plant for a community that takes its potable water from a Delta tributary? Many of the tributaries have between 0.1-0.3 ng/L of MeHg (e.g., Figure 6.3). Because the raw water used by the community could contain more MeHg than the effluent from the same community's WWTP, by the logic used here, the community should be given credit for removing MeHg from the tributary water rather than penalizing the community for their WWTP discharge. The approach used in the TMDL should treat the industrial and municipal dischargers in a similar manner.

10. Mercury runoff coefficients (TMDL p. 122)

I understand why mercury may be transported less easily than water when it comes in contact with land surfaces but the possibility that it could be more easily transported does not make a lot of sense to me. Is this a misstatement or can more explanation be provided here?

11. Table headings (TMDL p. 145-149)

I believe that the Table heading has an error: "Acceptable MeHg Concentration" should be in units of ng/L and not g/yr.

12. "Statistically Significant Regressions" (TMDL J-17)

The conclusion that all of these regressions are significant is questionable. For example, the Feather River graph shows about 30 data points with flows less than 30,000 cfs and three with higher flows. Without the three higher points I suspect that there would not be a significant relationship (i.e., it would look like a scatter plot). Simple linear regression models assume equal spacing of data and these regressions may be biased by a few high flow observations. It may be necessary to consult a statistician about the need to weigh

the data to avoid bias or to identify other ways to test the significance of putative relationships.

Sincerely,

David L. Sedlak
Professor

cc: Professor David Jenkins